

Simultaneous Temperature and Velocity Diagnostic for Reacting Flows, Phase I

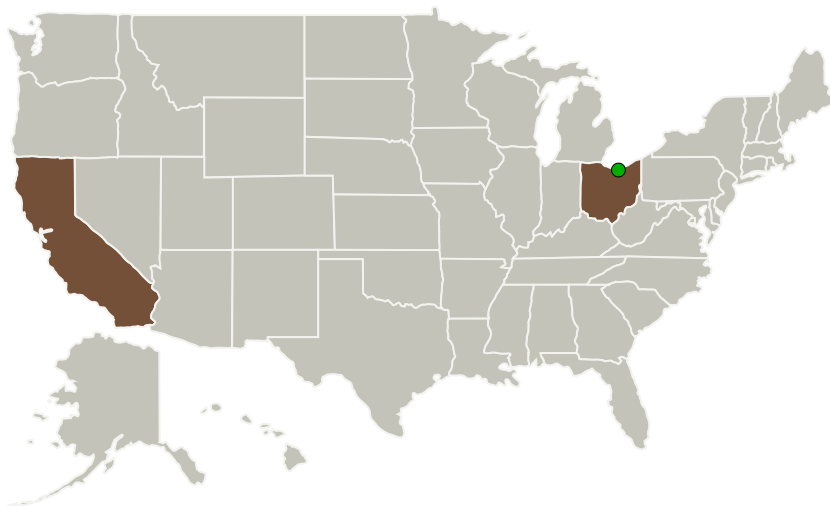
Completed Technology Project (2011 - 2011)



Project Introduction

A diagnostic technique is proposed for measuring temperature and velocity simultaneously in a high temperature reacting flow for aiding research in propulsion. The technique involves seeding particles of a ceramic thermographic phosphor into the flow and illuminating them with two overlapping pulsed laser sheets. Laser-induced luminescence from the particles will be measured to obtain temperature from its effects on luminescence lifetime. Velocity will be obtained simultaneously from the same particles using conventional particle image velocimetry (PIV). Each of the two diagnostics will employ a separate CCD camera that captures a pair of images separated by a short delay. For the thermometry technique, pixel intensity ratios of the delayed to the undelayed images will be related to temperature via a calibration function. In the PIV technique, particle displacements between the images will be obtained using conventional interrogation window techniques with cross-correlation. The proposed diagnostic is expected to enable spatially and temporally correlated measurements of two key variables in combustion modeling that cannot be obtained in most high temperatures flows using currently available methods. The phase I effort will demonstrate feasibility measurements in a flame.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MetroLaser, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

California	Ohio
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Project Transitions

**February 2011:** Project Start**September 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138505>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MetroLaser, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Tom Jenkins

Co-Investigator:

Thomas L Jenkins

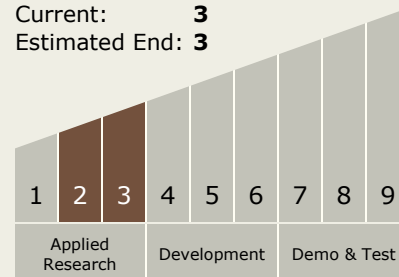
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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.5 Propulsion Flowpath and Interactions

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System